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Zinc supplementation in the management of diarrhoea

Biological, behavioural and contextual rationale

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A continuing lack of safe water and adequate sanitation in many parts of the world means that diarrhoea remains the leading cause of death among infants and young children in low- and middle-income countries (1). Every year more than a million children under five years of age succumb to the fluid loss and dehydration associated with the majority of diarrhoea related deaths. It is estimated that 13% of all years lost due to ill-health, disability, or early death (so-called “disability-adjusted life years”) are caused by diarrhoea (2–5).

Good guidelines on the clinical management of diarrhoea among the world’s most vulnerable children therefore remain critical. There are two simple and effective treatments for the clinical management of acute diarrhoea:

- use of low concentration oral rehydration salts (ORS)
- routine use of zinc supplementation, at a dosage of 20 milligrams per day for children older than six months or 10 mg per day in those younger than six months, for 10–14 days (6, 7).

Oral rehydration is a well-known and relatively simple treatment approach (8–14). Zinc supplementation has been found to reduce the duration and severity of diarrhoeal episodes and likelihood of subsequent infections for 2–3 months (15–18). Zinc supplements are generally accepted by both children and caregivers and are effective regardless of the type of common zinc salt used (zinc sulphate, zinc acetate or zinc gluconate) (7,19).

Supplementary zinc benefits children with diarrhoea because it is a vital micronutrient essential for protein synthesis, cell growth and differentiation, immune function, and intestinal transport of water and electrolytes (20–23). Zinc is also important for normal growth and development of children both with and without diarrhoea (24–26). Zinc deficiency is associated with an increased risk of gastrointestinal infections, adverse effects on the structure and function of the gastrointestinal tract, and impaired immune function (21,27–30). Dietary deficiency of zinc is especially common in low-income countries because of a low dietary intake of zinc-rich foods (mainly foods of animal origin) or

inadequate absorption caused by its binding to dietary fibre and phytates often found in cereals, nuts and legumes (31,32).

Although the benefits of zinc supplementation in the management of diarrhoea have been established, there remain a number of barriers to the widespread implementation of this treatment strategy. Currently, zinc is not used to treat most cases of diarrhoea because the known benefits of zinc supplementation are still not widely appreciated by physicians and health-care workers in developing countries (33). There is a need to establish the optimal dosage and to investigate whether the same benefits of zinc supplementation are also applicable to children in middle- or high-income nations (31). There is also concern that high zinc intakes may compete for absorption with other micronutrients such as iron and calcium. This, in turn, can have unintended negative consequences for children's health and development (31,34–36). Studies are needed to help identify subpopulations that would benefit most in resource-limited settings and to ensure access to zinc supplementation, especially for those families whose children are most at risk of diarrhoea but may not be able to afford treatments that include zinc supplements (37). However, zinc deficiency remains difficult to diagnose because measuring serum zinc levels is not necessarily accurate for this purpose (31,38).

Currently, only a very small proportion of children in need have access to zinc supplementation (37). Guidelines on the use of zinc supplementation in the management of diarrhoea may accelerate progress towards the United Nations Millennium Development Goal 4 for reducing child mortality by two-thirds by 2015 (39).

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Declarations of interests

Conflict of interest statements were collected from all named authors and no conflicts were identified.

Corresponding intervention

– Zinc supplementation in the management of diarrhoea